IN THE SPECIFICATION:

Please amend the specification on page 3 line 12 as follows:

W

~~FIG. 3 is a photograph of a packaged sensor of the present invention;~~

Please amend the specification on page 6 as follows:

R1

The present inventors recognized that a DVRT sensor that includes the circuit of '593 patent, incorporated herein by reference, provides substantial advantage in temperature compensation, but does not include all the temperature correcting needed. They recognized that a bridge circuit, such as that included in a DVRT, cancels the effects of uniform changes in temperature in the wiring of the coils of the DVRT, a substantial advantage for such differential sensors. They also recognized that the circuit of the '593 patent adequately corrects for the different coil wire resistances introduced by temperature gradients across the coils, an advantage in applications, such as automotive where such temperature gradients are common. The inventors then recognized an additional mechanism by which a change <u>in</u> temperature can cause errors: the magnetic permeability of the ferrite core varies with temperature. This change in permeability with temperature introduces a change in the inductance and reactance of the coils. They also recognized that uniform temperature change of the core is not canceled out by the bridge configuration of a DVRT and that no correction was provided by the gradient of the temperature correcting circuit of the '593 patent that corrected only for spacial variation in temperature.

Please amend the specification on page 7-8 as follows:

R2 Cont

In view of the temperature dependence of core permeability, accuracy of inductive sensors was limited to about 0.05% gain error/degree C at the fully displaced core position. Thus, for a 100 degree temperature swing the error is 5%, which may be unacceptable large for some applications. A unique solution to reduce the error from temperature variation is provided by the present invention, and this solution can be applied in both single coil and dual coil transducers. By overcoming the error introduced by temperature variation the accuracy of the single coil sensor is substantially improved. However, dual ~~core~~ <u>coil</u> transducers continue to have advantage since they also cancel out error from change in winding resistance with change in temperature.

Please amend the specification on page 8 as follows:

Differential pair of coils 20a, 20b for displacement sensor 22 are arranged in full Wheatstone bridge circuit ~~24~~ <u>24a</u>, as shown in FIG. 1 and FIGS 2a, 2b. A single coil in a half Wheatstone bridge circuit can also be used. Both an AC sinusoidal voltage and a DC voltage are applied across bridge inputs 26a, 26b. Typically AC voltage is about 5 volts

peak to peak at about 70kHz and DC voltage is about 1 volt. Of course various other voltage amplitudes and frequencies can be used for each. For example, instead of a DC voltage a low frequency AC voltage can be used, such as 1 volt at 100 Hz. This would enable the use of an AC synchronous demodulator, as shown in FIG 1, which improves signal to noise ratio in a high noise environment.

P2 Cont'd

Capacitors 28a, 28b and inductors 30a, 30b are used to isolate AC and DC drive voltages from each other. Capacitors 28a, 28b can have a value of about 1microfarad and inductors 30a, 30b a value of about 1000 microhenries. Various other values can be used depending on the two frequencies of the two applied voltages.

The DC resistance of each coil 20a, 20b of Wheatstone bridge ~~24~~ 24a is proportional to temperature. This DC resistance of wiring in coils 20a, 20b is independent of the position of core 41 within coils 20a, 20b, varying only with temperature, so a change in DC voltage across the coils, which is proportional to their resistance, provides a measurement of a change in temperature. Coils 20a, 20b are fabricated of wire having a dimension of about 48 gauge and typically has a resistance of about 20 ohms for each coil.

Please amend the specification on page 8 as follows:

P3

Because the DC resistance of each coil is very low greater accuracy is obtained by summing DC voltages across both coils to ~~to~~ provide an indication of the temperature of the coils. This DC voltage is obtained by passing output signals from output terminals 32a, 32b of coils 20a, 20b through low pass filter 34 and summing the voltage drops across each coil 20a, 20b individually in summing amplifier 40. Typically the voltage sum is about 100mV at room temperature and this will vary as temperature changes.

Please amend the specification on page 10-11 as follows:

As more fully described in the '593 patent, incorporated herein by reference, temperature gradient correcting circuit 52 provides a DC voltage level corresponding to amplitude of displacement of core 41 corrected for spatial variation in temperature across coils 20a, 20b. The AC signal between output terminals 32a, 32b of coils 20a, 20b is first analyzed by stripping off DC and low frequency signal at high pass filter 44. The AC signal is now converted to a DC level in AC synchronous demodulator 54. The DC level gives an uncompensated indication of the magnitude of displacement of core 41 in coils 32a, 32b. A first compensation step is now provided to the signal from demodulator 54 with gradient of temperature information from DC signal conditioner 56 in difference amplifier 50. DC signal conditioner 56 provides an output that is proportional to the difference in temperature between the two coils to give the temperature gradient information. The output of difference amplifier 50 is a signal proportional to the displacement of core 41 corrected for gradient of temperature across coils 20a, 20b. The

output of VGA 42 is a signal proportional to the displacement of core 41 corrected for both gradient of temperature across coils 20a, 20b and for a change of temperature with time across both coils 20a, 20b and core 41~~core 41~~.

A4 Con'd

[Please amend the specification on page ~~11~~ as follows:]

In one alternative, a low frequency signal can be used instead of a DC signal. In this case AC synchronous demodulator 58 would be used in place of signal conditioner 56, and similarly connected as shown by dotted line ~~60~~ 59 of FIG. 1.

Please amend the specification on page 12 as follows:

A5

where D is the displacement of core 41. At any particular temperature, M(T) is a constant indicating the slope of the linear relationship between displacement and measured AC voltage V. M(T) depends on the permeability of core 41, on the magnitude of V_{AC} and the voltage gain of amplifiers in AC synchronous demodulator 54 ~~circuit 52~~. Since the permeability of core 41 depends on temperature M(T) will be a function of temperature too. More specifically, ~~D~~ equation (1) links displacement D of core 41 to voltage V across coils 20a, 20b at output pads 32a, 32b. ω is the frequency of the AC signal applied across pads 26a, 2b. L_1 is the inductance of coil 20a and L_2 is the inductance of coil 20b including the effect of core 41 within each coil. G(T) is a function that has an inverse relationship to temperature to that of M(T) to compensate for the change in permeability of core 41 with temperature so that product of M(T) and G(T) is constant at all temperatures. C is the y intercept of the linear relationship and is a constant that depends on the definition of the initial position of core 41core 41. Voltage $V(\omega L_1 - \omega L_2)$ is determined from voltages proportional to resistance and reactance in coils 32a, 32b of sensor 22. For each coil,

Please amend the specification on page 13-14 as follows:

A6

~~Correcting circuit 52~~ difference amplifier 50 subtracts the sum of voltages associated with wire resistance of both coils from the voltage associated with the overall impedance of the coils to obtain the voltage associated with just the inductive reactance of the coils. This voltage is now corrected according to G(T) for temperature change in core 41 based on the same resistance used in equations (2) and (3).

Please amend the specification on page 14 as follows:

A7

The voltage associated with the resistance is actually used by ~~circuit 52~~ difference amplifier 50 to calculate the voltage difference associated just with the difference in inductive reactance of the two coils, as shown in step 66. Temperature correction of voltage is now provided for change in temperature of core 41. Displacement is now calculated as shown in step ~~70~~ 68.